

CLAIMS**We claim:**

1. A composition, comprising:
a nanoparticle consisting essentially of a rare earth element doped in a metal oxide, wherein the surface of said nanoparticle is functionalized with a biological molecule or a polyionic polymer, and wherein said nanoparticle is capable of light emission.
2. A composition, comprising:
a silica glass nanoparticle consisting essentially of a first metal oxide and optionally a second metal oxide, wherein the surface of said nanoparticle is functionalized with a biological material or a polyionic polymer, and wherein said nanoparticle is capable of light emission.
3. The composition of claim 2, wherein said first metal oxide or said second metal oxide is a rare earth oxide.
4. A composition, comprising:
a magnetic nanoparticle core and a shell comprising a first metal oxide and optionally a second metal oxide, wherein said nanoparticle is capable of light emission.
5. The composition of claim 4, wherein said first metal oxide or said second metal oxide is a rare earth oxide.
6. The composition of claim 4, wherein the surface of said nanoparticle is functionalized with a biological material or a polyionic polymer.
7. The composition of any of claims 1, 2, and 6, wherein said biological molecule or polyionic polymer is selected from the group consisting of a protein, a peptide, a nucleic acid, a lipid, a poly-lysine, and a carbohydrate.
8. The composition of claim 7, wherein said protein is selected from the group consisting of an antibody, an antibody fragment, an scFv, and a receptor.
9. The composition of any one of claims 1-8, wherein said nanoparticle is capable of fluorescent light emission.
10. The composition of any one of claims 1-8, wherein said nanoparticle is capable of phosphorescent light emission.
11. The composition of any of claims 1-8, wherein the diameter of said nanoparticle is between 10 nm and 1000 nm.
12. The composition of claim 11, wherein the diameter of said nanoparticle is between 10 nm and 200 nm.
13. The composition of claim 12, wherein the diameter of said nanoparticle is between 10 nm and 100 nm.